Neftyanoe Khozyaystvo - Oil Industry 2017 N5, pages 92-93

Usability of contaminated groundwater of the upper section in the reservoir pressure maintenance system (on the example of the Republic of Tatarstan)

Musin R., Korolev E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

More than 50-years exploitation of large oil fields in Tatarstan has led to substantial transformation of hydrogeoecological conditions at different levels of the section. The most dangerous of them is intense and bulk pollution of the fresh groundwater area with salt brines produced together with fresh water. In some parts of Romashkinskoye, Bavlynskoye and Novo-Elkhovskoye deposits share of underground water with high salinity (up to 5-10 g/dm 3), hardness (up to 40-70 mmol/dm 3) and the chloride concentration (more than 20%-mole) as a part of Lower Kazanian bearing complex, which is the most productive part of the section, can reach 60 %. Sometimes (for protection of the existing underground drinking water intake, elimination or localization of water pollution focus) the most optimal way to dispose contaminated water is their use in the reservoir pressure maintenance system. This may appear negative side effects such as scaling in oil horizons, wells and communication. The probability of calcium sulfate and calcium carbonate sediments, which are the commonest salts complicated oil production process in Tatarstan, was estimated on the basis of the analysis of underground water composition in the upper section (15 water samples of Lower Kazanian aquifer), water composition in oil-bearing horizon in the Devonian sequence (358 samples) and mixtures of underground water at different depths (465 virtual samples). It is shown that the most stable in respect of scale are mixtures with mineralization 68-104 g/dm 3 . For rapid determination of their resistance in respect of scaling regression connections are shown, their use is possible if there are data of mineralization, pH and also the concentrations of ions HCO 3 - , SO 4 2- , Ca 2+ in groundwater at different depths.

http://dx.doi.org/10.24887/0028-2448-2017-5-92-93

Keywords

Reservoir pressure maintenance system, Scaling, Underground water, Water contamination

References

[1] Musin R.Kh., Kalkamanova Z.G., The formation of the underground water in the upper part of hydrolithosphere in the Vostochno-Zakamsky region of Tatarstan (In Russ.), Neftyanoe khozyaystvo = Oil Industry, 2016, no. 2, pp. 18-22.

[2] Kashchavtsev V.E., Gattenberger Yu.P., Lyushin S.F., Preduprezhdenie soleobrazovaniya pri dobyche nefti (Prevention of salt formation during oil production), Moscow: Nedra Publ., 1985, 215 p.

[3] Kashchavtsev V.E., Mishchenko I.T., Soleobrazovanie pri dobyche nefti (Salt formation during oil production), Moscow: Orbita Publ., 2004, 432 p.

[4] Kudryashova L.V., Opredelenie prigodnosti dlya zakachki v plast tekhnicheskoy vody vodozabornykh skvazhin NGDU "Zainskneft'" (Applicability appraisal of water supply wells for technical water injection into the reservoir of Zainskneft), Bugul'ma: Publ. of TatNIPIneft', 2002, 37 p.